LABORATORY REPORT

February 9, 2012

Tim Pool
Aquaterra Environmental Solutions, Inc.
13 Executive Dr., Suite 1
Fairview Heights, IL 62208

RE: Cottonwood Hills Flare Gas Sample / 4733.11

Dear Tim:

Enclosed are the results of the samples submitted to our laboratory on January 27, 2012. For your reference, these analyses have been assigned our service request number P1200302.

All analyses were performed according to our laboratory's NELAP and DoD-ELAP-approved quality assurance program. The test results meet requirements of the current NELAP and DoD-ELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP and DoD-ELAP-accredited analytes, refer to the certifications section at www.caslab.com. Results are intended to be considered in their entirety and apply only to the samples analyzed and reported herein.

Columbia Analytical Services, Inc. is certified by the California Department of Health Services, NELAP Laboratory Certificate No. 02115CA; Arizona Department of Health Services, Certificate No. AZ0694; Florida Department of Health, NELAP Certification E871020; New Jersey Department of Environmental Protection, NELAP Laboratory Certification ID #CA009; New York State Department of Health, NELAP NY Lab ID No: 11221; Oregon Environmental Laboratory Accreditation Program, NELAP ID: CA20007; The American Industrial Hygiene Association, Laboratory #101661; United States Department of Defense Environmental Laboratory Accreditation Program (DoD-ELAP), Certificate No. L10-3-R2; Pennsylvania Registration No. 68-03307; TX Commission of Environmental Quality, NELAP ID T104704413-11-2; Minnesota Department of Health, NELAP Certificate No. 362188; Washington State Department of Ecology, ELAP Lab ID: C946, State of Utah Department of Health, NELAP Certificate No. CA015272011-1; Los Angeles Department of Building and Safety, Approval No: TA00001. Each of the certifications listed above have an explicit Scope of Accreditation that applies to specific matrices/methods/analytes; therefore, please contact me for information corresponding to a particular certification.

If you have any questions, please call me at (805) 526-7161.

Respectfully submitted,

Columbia Analytical Services, Inc.

Digitally signed by Sue Anderson
Date: 2012.02.09 14:05:52 -08'00'

Sue Anderson
Project Manager

Client: Aquaterra Environmental Solutions, Inc. CAS Project No: P1200302
Project: Cottonwood Hills Flare Gas Sample / 4733.11

CASE NARRATIVE

The samples were received intact under chain of custody on January 27, 2012 and were stored in accordance with the analytical method requirements. The valve on sample CWH-1 (P1200302-001) was found to be open upon receipt at the laboratory. The valve was closed upon receipt and enough volume was present to analyze per client instruction. Please refer to the sample acceptance check form for additional information. The results reported herein are applicable only to the condition of the samples at the time of sample receipt.

Sulfur Analysis

The samples were analyzed for twenty sulfur compounds per ASTM D 5504-08 using a gas chromatograph equipped with a sulfur chemiluminescence detector (SCD). All compounds with the exception of hydrogen sulfide and carbonyl sulfide are quantitated against the initial calibration curve for methyl mercaptan.

DETAIL SUMMARY REPORT

Client: Aquaterra Environmental Solutions, Inc.
Service Request: P1200302
Project ID: Cottonwood Hills Flare Gas Sample / 4733.11

Date Received: 1/27/2012
Time Received: 09:30

Client Sample ID	Lab Code	Matrix	Date Collected	Time Collected	ASTM D5504-01 - Sulfur Bag
CWH-1	P1200302-001	Air	1/26/2012	13:05	X
CWH-2	P1200302-002	Air	1/26/2012	13:10	X
CWH-3	P1200302-003	Air	1/26/2012	13:15	X

Columbia Analytical Services

2655 Park Center Drive, Suite A
Simi Valley, California 93065
Phone (805) 526-7161
Fax (805) 526-7270

Air - Chain of Custody Record & Analytical Service Request

Requested Turnaround Time in Business Days (Surcharges) please circle
1 Day (100%) 2 Day (75%) 3 Day (50%) 4 Day (35%) 5 Day (25%) 10 Day-Standard

CAS Project No. P1200302

Company Name & Address (Reporting Information)
Aquaterra Environmental Solutions Inc
13 Executive Dr Suite 1
Fairview Heights IL 62208

Project Name: Cottonwood Hills Flare Gas Sample
Project Number: 4733.11

CAS Contact:

Project Manager: Tim Pool

P.O. # / Billing Information

Phone: 618-628-2001
Fax: 618-628-2002

Email Address for Result Reporting: tpool@aquaterra-env.com

Sampler (Print & Sign): Tim Pool

Client Sample ID	Laboratory ID Number	Date Collected	Time Collected	Canister ID (Bar code # - AC, SC, etc.)	Flow Controller ID (Bar code #- FC #)	Canister Start Pressure "Hg	Canister End Pressure "Hg/psig	Sample Volume	Analysis Method: ASTM D5504 total sulfur compounds		Comments e.g. Actual Preservative or specific instructions
CWH-1	1	1-26-12	1305	90675-47506				1L	X		Include H_2S
CWH-2	2	1-26-12	1310	90675-47503				1L	X		↓
CWH-3	3	1-26-12	1315	90675-47507				1L	X		↓

Report Tier Levels - please select
Tier I - Results (Default if not specified) ✓
Tier II (Results + QC Summaries) _____
Tier III (Results + QC & Calibration Summaries) _____
Tier IV (Data Validation Package) 10% Surcharge _____

EDD required Yes / No
Type: _____

Project Requirements (MRLs, QAPP)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
	1-26-12	1500		1/27/12	0900
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:

Cooler / Blank Temperature ____°C

COC AIR REV 3-11

4 of 11

WM00956

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Sample Acceptance Check Form

Client: Aquaterra Environmental Solutions, Inc. Work order: P1200302

Project: Cottonwood Hills Flare Gas Sample / 4733.11

Sample(s) received on: 1/27/12 Date opened: 1/27/12 by: MZAMORA

Note: This form is used for all samples received by CAS. The use of this form for custody seals is strictly meant to indicate presence/absence and not as an indication of compliance or nonconformity. Thermal preservation and pH will only be evaluated either at the request of the client and/or as required by the method/SOP.

		Yes	No	N/A
1	Were **sample containers** properly marked with client sample ID?	☒	☐	☐
2	Container(s) **supplied by CAS**?	☒	☐	☐
3	Did **sample containers** arrive in good condition?	☒	☐	☐
4	Were **chain-of-custody** papers used and filled out?	☒	☐	☐
5	Did **sample container labels** and/or tags agree with custody papers?	☒	☐	☐
6	Was **sample volume** received adequate for analysis?	☒	☐	☐
7	Are samples within specified holding times?	☒	☐	☐
8	Was proper **temperature** (thermal preservation) of cooler at receipt adhered to?	☐	☐	☒
9	Was a **trip blank** received?	☐	☐	☒
10	Were **custody seals** on outside of cooler/Box?	☐	☒	☐
	Location of seal(s)? _____ Sealing Lid?	☐	☐	☒
	Were signature and date included?	☐	☐	☒
	Were seals intact?	☐	☐	☒
	Were custody seals on outside of sample container?	☐	☒	☐
	Location of seal(s)? _____ Sealing Lid?	☐	☐	☒
	Were signature and date included?	☐	☐	☒
	Were seals intact?	☐	☐	☒
11	Do containers have appropriate **preservation**, according to method/SOP or Client specified information?	☐	☐	☒
	Is there a client indication that the submitted samples are **pH** preserved?	☐	☐	☒
	Were **VOA vials** checked for presence/absence of air bubbles?	☐	☐	☒
	Does the client/method/SOP require that the analyst check the sample pH and if necessary alter it?	☐	☐	☒
12	**Tubes:** Are the tubes capped and intact?	☐	☐	☒
	Do they contain moisture?	☐	☐	☒
13	**Badges:** Are the badges properly capped and intact?	☐	☐	☒
	Are dual bed badges separated and individually capped and intact?	☐	☐	☒

Lab Sample ID	Container Description	Required pH *	Received pH	Adjusted pH	VOA Headspace (Presence/Absence)	Receipt / Preservation Comments
P1200302-001.01	1 L Zefon Bag					Received Tedlar bag with valve open
P1200302-002.01	1 L Zefon Bag					
P1200302-003.01	1 L Zefon Bag					

Explain any discrepancies: (include lab sample ID numbers): _____

RSK - MEEPP, HCL (pH<2); RSK - CO2, (pH 5-8); Sulfur (pH>4)

WM00957

RESULTS OF ANALYSIS

Client: **Aquaterra Environmental Solutions, Inc.**
Client Sample ID: **CWH-1**
Client Project ID: **Cottonwood Hills Flare Gas Sample / 4733.11**

CAS Project ID: P1200302
CAS Sample ID: P1200302-001

Test Code: ASTM D 5504-08
Instrument ID: Agilent 6890A/GC13/SCD
Analyst: Wade Henton
Sampling Media: 1 L Zefon Bag
Test Notes:

Date Collected: 1/26/12
Time Collected: 13:05
Date Received: 1/27/12
Date Analyzed: 1/27/12
Time Analyzed: 11:38
Volume(s) Analyzed: 1.0 ml(s)

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
7783-06-4	Hydrogen Sulfide	**4,600**	7.0	**3,300**	5.0	
463-58-1	Carbonyl Sulfide	**57**	12	**23**	5.0	
74-93-1	Methyl Mercaptan	**1,900**	9.8	**980**	5.0	
75-08-1	Ethyl Mercaptan	**61**	13	**24**	5.0	
75-18-3	Dimethyl Sulfide	**7,600**	13	**3,000**	5.0	
75-15-0	Carbon Disulfide	**42**	7.8	**14**	2.5	
75-33-2	Isopropyl Mercaptan	**270**	16	**86**	5.0	
75-66-1	tert-Butyl Mercaptan	**560**	18	**150**	5.0	
107-03-9	n-Propyl Mercaptan	**44**	16	**14**	5.0	
624-89-5	Ethyl Methyl Sulfide	**99**	16	**32**	5.0	
110-02-1	Thiophene	**360**	17	**100**	5.0	
513-44-0	Isobutyl Mercaptan	**110**	18	**30**	5.0	**W**
352-93-2	Diethyl Sulfide	ND	18	ND	5.0	
109-79-5	n-Butyl Mercaptan	**53**	18	**14**	5.0	
624-92-0	Dimethyl Disulfide	**130**	9.6	**33**	2.5	
616-44-4	3-Methylthiophene	**110**	20	**28**	5.0	
110-01-0	Tetrahydrothiophene	ND	18	ND	5.0	
638-02-8	2,5-Dimethylthiophene	ND	23	ND	5.0	
872-55-9	2-Ethylthiophene	ND	23	ND	5.0	
110-81-6	Diethyl Disulfide	ND	12	ND	2.5	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
W = Result quantified, but the corresponding peak was detected outside of generated retention time window.

RESULTS OF ANALYSIS

Client: **Aquaterra Environmental Solutions, Inc.**
Client Sample ID: **CWH-2**
Client Project ID: **Cottonwood Hills Flare Gas Sample / 4733.11**

CAS Project ID: P1200302
CAS Sample ID: P1200302-002

Test Code: ASTM D 5504-08
Instrument ID: Agilent 6890A/GC13/SCD
Analyst: Wade Henton
Sampling Media: 1 L Zefon Bag
Test Notes:

Date Collected: 1/26/12
Time Collected: 13:10
Date Received: 1/27/12
Date Analyzed: 1/27/12
Time Analyzed: 11:59
Volume(s) Analyzed: 1.0 ml(s)

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
7783-06-4	Hydrogen Sulfide	**22,000**	7.0	**16,000**	5.0	
463-58-1	Carbonyl Sulfide	**190**	12	**76**	5.0	
74-93-1	Methyl Mercaptan	**8,100**	9.8	**4,100**	5.0	
75-08-1	Ethyl Mercaptan	**250**	13	**97**	5.0	
75-18-3	Dimethyl Sulfide	**26,000**	13	**10,000**	5.0	
75-15-0	Carbon Disulfide	**130**	7.8	**43**	2.5	
75-33-2	Isopropyl Mercaptan	**920**	16	**300**	5.0	
75-66-1	tert-Butyl Mercaptan	**1,700**	18	**460**	5.0	
107-03-9	n-Propyl Mercaptan	**110**	16	**36**	5.0	
624-89-5	Ethyl Methyl Sulfide	**300**	16	**98**	5.0	
110-02-1	Thiophene	**1,200**	17	**350**	5.0	
513-44-0	Isobutyl Mercaptan	**370**	18	**100**	5.0	**W**
352-93-2	Diethyl Sulfide	**39**	18	**11**	5.0	
109-79-5	n-Butyl Mercaptan	**190**	18	**52**	5.0	
624-92-0	Dimethyl Disulfide	**370**	9.6	**95**	2.5	
616-44-4	3-Methylthiophene	**400**	20	**99**	5.0	
110-01-0	Tetrahydrothiophene	**78**	18	**22**	5.0	
638-02-8	2,5-Dimethylthiophene	**51**	23	**11**	5.0	
872-55-9	2-Ethylthiophene	**49**	23	**11**	5.0	
110-81-6	Diethyl Disulfide	ND	12	ND	2.5	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
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W = Result quantified, but the corresponding peak was detected outside of generated retention time window.

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RESULTS OF ANALYSIS

Client: **Aquaterra Environmental Solutions, Inc.**
Client Sample ID: **CWH-3**
Client Project ID: **Cottonwood Hills Flare Gas Sample / 4733.11**

CAS Project ID: P1200302
CAS Sample ID: P1200302-003

Test Code: ASTM D 5504-08
Instrument ID: Agilent 6890A/GC13/SCD
Analyst: Wade Henton
Sampling Media: 1 L Zefon Bag
Test Notes:

Date Collected: 1/26/12
Time Collected: 13:15
Date Received: 1/27/12
Date Analyzed: 1/27/12
Time Analyzed: 12:22
Volume(s) Analyzed: 1.0 ml(s)

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
7783-06-4	Hydrogen Sulfide	**22,000**	7.0	**16,000**	5.0	
463-58-1	Carbonyl Sulfide	**190**	12	**76**	5.0	
74-93-1	Methyl Mercaptan	**7,600**	9.8	**3,900**	5.0	
75-08-1	Ethyl Mercaptan	**230**	13	**90**	5.0	
75-18-3	Dimethyl Sulfide	**25,000**	13	**9,800**	5.0	
75-15-0	Carbon Disulfide	**130**	7.8	**43**	2.5	
75-33-2	Isopropyl Mercaptan	**870**	16	**280**	5.0	
75-66-1	tert-Butyl Mercaptan	**1,500**	18	**420**	5.0	
107-03-9	n-Propyl Mercaptan	**100**	16	**32**	5.0	
624-89-5	Ethyl Methyl Sulfide	**270**	16	**86**	5.0	
110-02-1	Thiophene	**1,100**	17	**320**	5.0	
513-44-0	Isobutyl Mercaptan	**340**	18	**91**	5.0	**W**
352-93-2	Diethyl Sulfide	**29**	18	**8.0**	5.0	
109-79-5	n-Butyl Mercaptan	**180**	18	**49**	5.0	
624-92-0	Dimethyl Disulfide	**320**	9.6	**83**	2.5	
616-44-4	3-Methylthiophene	**360**	20	**90**	5.0	
110-01-0	Tetrahydrothiophene	**65**	18	**18**	5.0	
638-02-8	2,5-Dimethylthiophene	**33**	23	**7.1**	5.0	
872-55-9	2-Ethylthiophene	**30**	23	**6.5**	5.0	
110-81-6	Diethyl Disulfide	ND	12	ND	2.5	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
W = Result quantified, but the corresponding peak was detected outside of generated retention time window.

WM00960

RESULTS OF ANALYSIS

Client: **Aquaterra Environmental Solutions, Inc.**
Client Sample ID: **Method Blank**
Client Project ID: **Cottonwood Hills Flare Gas Sample / 4733.11**

CAS Project ID: P1200302
CAS Sample ID: P120127-MB

Test Code: ASTM D 5504-08
Instrument ID: Agilent 6890A/GC13/SCD
Analyst: Wade Henton
Sampling Media: 1 L Zefon Bag
Test Notes:

Date Collected: NA
Time Collected: NA
Date Received: NA
Date Analyzed: 1/27/12
Time Analyzed: 08:22
Volume(s) Analyzed: 1.0 ml(s)

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
7783-06-4	Hydrogen Sulfide	ND	7.0	ND	5.0	
463-58-1	Carbonyl Sulfide	ND	12	ND	5.0	
74-93-1	Methyl Mercaptan	ND	9.8	ND	5.0	
75-08-1	Ethyl Mercaptan	ND	13	ND	5.0	
75-18-3	Dimethyl Sulfide	ND	13	ND	5.0	
75-15-0	Carbon Disulfide	ND	7.8	ND	2.5	
75-33-2	Isopropyl Mercaptan	ND	16	ND	5.0	
75-66-1	tert-Butyl Mercaptan	ND	18	ND	5.0	
107-03-9	n-Propyl Mercaptan	ND	16	ND	5.0	
624-89-5	Ethyl Methyl Sulfide	ND	16	ND	5.0	
110-02-1	Thiophene	ND	17	ND	5.0	
513-44-0	Isobutyl Mercaptan	ND	18	ND	5.0	
352-93-2	Diethyl Sulfide	ND	18	ND	5.0	
109-79-5	n-Butyl Mercaptan	ND	18	ND	5.0	
624-92-0	Dimethyl Disulfide	ND	9.6	ND	2.5	
616-44-4	3-Methylthiophene	ND	20	ND	5.0	
110-01-0	Tetrahydrothiophene	ND	18	ND	5.0	
638-02-8	2,5-Dimethylthiophene	ND	23	ND	5.0	
872-55-9	2-Ethylthiophene	ND	23	ND	5.0	
110-81-6	Diethyl Disulfide	ND	12	ND	2.5	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

LABORATORY CONTROL SAMPLE SUMMARY

Client: **Aquaterra Environmental Solutions, Inc.**
Client Sample ID: **Lab Control Sample** CAS Project ID: P1200302
Client Project ID: **Cottonwood Hills Flare Gas Sample / 4733.11** CAS Sample ID: P120127-LCS

Test Code: ASTM D 5504-08 Date Collected: NA
Instrument ID: Agilent 6890A/GC13/SCD Date Received: NA
Analyst: Wade Henton Date Analyzed: 1/27/12
Sampling Media: 1 L Zefon Bag Volume(s) Analyzed: NA ml(s)
Test Notes:

CAS #	Compound	Spike Amount ppbV	Result ppbV	% Recovery	CAS Acceptance Limits	Data Qualifier
7783-06-4	Hydrogen Sulfide	2,380	**1,780**	**75**	51-141	
463-58-1	Carbonyl Sulfide	2,470	**1,700**	**69**	63-147	
74-93-1	Methyl Mercaptan	2,360	**2,110**	**89**	54-156	

LABORATORY DUPLICATE SUMMARY RESULTS

Client: **Aquaterra Environmental Solutions, Inc.**
Client Sample ID: **CWH-3**
Client Project ID: **Cottonwood Hills Flare Gas Sample / 4733.11**

CAS Project ID: P1200302
CAS Sample ID: P1200302-003DUP

Test Code: ASTM D 5504-08
Instrument ID: Agilent 6890A/GC13/SCD
Analyst: Wade Henton
Sampling Media: 1 L Zefon Bag
Test Notes:

Date Collected: 1/26/12
Time Collected: 13:15
Date Received: 1/27/12
Date Analyzed: 1/27/12
Time Analyzed: 12:48
Volume(s) Analyzed: 1.0 ml(s)

CAS #	Compound	Sample Result		Duplicate Sample Result		Average	% RPD	RPD Limit	Data Qualifier
		µg/m³	ppbV	µg/m³	ppbV	**ppbV**			
7783-06-4	Hydrogen Sulfide	22,400	16,100	22,700	16,300	16200	**1**	34	
463-58-1	Carbonyl Sulfide	187	76.2	186	75.7	75.95	**0.7**	35	
74-93-1	Methyl Mercaptan	7,650	3,890	7,570	3,850	3870	**1**	41	
75-08-1	Ethyl Mercaptan	229	90.0	233	91.6	90.8	**2**	41	
75-18-3	Dimethyl Sulfide	25,000	9,830	24,500	9,650	9740	**2**	41	
75-15-0	Carbon Disulfide	133	42.7	123	39.6	41.15	**8**	41	
75-33-2	Isopropyl Mercaptan	870	280	861	277	278.5	**1**	41	
75-66-1	tert-Butyl Mercaptan	1,540	419	1,500	406	412.5	**3**	41	
107-03-9	n-Propyl Mercaptan	99.6	32.0	96.1	30.9	31.45	**3**	41	
624-89-5	Ethyl Methyl Sulfide	268	86.0	282	90.7	88.35	**5**	41	
110-02-1	Thiophene	1,090	318	1,050	305	311.5	**4**	41	
513-44-0	Isobutyl Mercaptan	336	91.2	342	92.7	91.95	**2**	41	**W**
352-93-2	Diethyl Sulfide	29.4	7.97	40.0	10.9	9.435	**31**	41	
109-79-5	n-Butyl Mercaptan	180	48.7	182	49.5	49.1	**2**	41	
624-92-0	Dimethyl Disulfide	320	83.1	309	80.2	81.65	**4**	41	
616-44-4	3-Methylthiophene	362	90.3	350	87.3	88.8	**3**	41	
110-01-0	Tetrahydrothiophene	65.1	18.1	67.1	18.6	18.35	**3**	41	
638-02-8	2,5-Dimethylthiophene	32.6	7.10	38.8	8.45	7.775	**17**	41	
872-55-9	2-Ethylthiophene	29.9	6.51	38.0	8.28	7.395	**24**	41	
110-81-6	Diethyl Disulfide	ND	ND	ND	ND	-	-	41	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
W = Result quantified, but the corresponding peak was detected outside of generated retention time window.